

Choice Based Credit System Syllabus  
(2019 pattern)

**Mapping of Program Outcomes with Course Outcomes**

**Class:** T. Y. B. Voc.(SEM – VI)

**Subject:** Dairy Technology

**Course:** dairy product development (Th)

**Course Code:** BDT- 601

**Objectives-**

- To understand the different types of milk and their making procedures, compositions and use.
- To learn about frozen dairy products, their making procedure and technology used in making.

**Unit 1- Condensed Milks-**Definition, concept, manufacturing process, judging, grading and defects of condensed milk, **12 Periods**

**Unit 2 Dried Milk Products-**Definition, Composition, Classification, Standards and principles of drying, changes during drying, advantages and disadvantages of drying, , infant baby food, SMP, WMP, WPC, Ice cream mix powder **12 Periods**

**Unit 3 Ice Cream:** Definition, Composition, Classification and Standards (Legal and Others)Principle and Method of Manufacture. Technology used in ice cream making **12 Periods**

**Unit 4- Frozen Dairy Deserts:** Definition, Composition, Classification and Standards (Legal and Others)Principle and Method of Manufacture **12 Periods**

**Unit-5By – Products:** Skim Milk – Casein and Caseinates, Whey – Whey Beverages, Whey Powder, Lactose, Whey Protein Concentrates, Buttermilk and Ghee Residue, New Technologies in By-product Utilization (Membrane Processing – Reverse Osmosis and Ultra Filtration) **12 Periods**

**References-**

- Ice Cream 4<sup>th</sup> Edition – Arbuckle W.S. (1986)
- Ice Cream: Manufacture and Technology- Bhandari Vivek (2001)
- By Products from milks – Webb B.H. (1970)
- Outlines of Dairy Technology, (1980) Sukumar De

**Weightage:** 1=weakerlowrelation,2=moderateorpartialrelation,3=strongordirectrelation

Course Outcomes	Programme Outcomes(POs)								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3		2	3	3	2			
CO2	3	3	2						3
CO3	3		3						
CO4		3		3			1		

CO5	3	3	3	3				3	
CO6	3	3	3						
CO7	3		3		2		1		

### **Justification for the mapping**

#### **PO1: Disciplinary Knowledge:**

CO1: Demonstrate a comprehensive understanding of the economic significance of dried milk products..

CO2: Apply critical thinking skills to analyze the production process of dried milk.

CO3: Differentiate between ice-cream and frozen dairy dessert, showcasing critical reasoning abilities.

CO5: Articulate information on by-products in the dairy industry with clarity..

CO6: Investigate and present principles and workings behind spray drying in the production of dried milk.

CO7: Explore and present information on different types of milk through research.

#### **PO2: Critical Thinking and Problem Solving:**

CO2: Apply critical thinking skills to analyze the production process of dried milk.

CO4: They will understand the working of spray and roller drier.

CO5: Articulate information on by-products in the dairy industry with clarity

CO6: Investigate and present principles and workings behind spray drying in the production of dried milk.

#### **PO3: Social Competence Exhibit thoughts and ideas effectively in writing and orally:**

CO1: This can be Demonstrate especially through presentations a comprehensive understanding of the economic significance of dried milk products..

CO2: Apply critical thinking skills especially through presentations to analyze the production process of dried milk.

CO3: Through reports, Differentiate between ice-cream and frozen dairy dessert, showcasing critical reasoning abilities.

CO5: This can be through Articulate information on by-products in the dairy industry with clarity..

CO6: Investigate and present principles and workings behind spray drying in the production of dried milk.

CO7: Explore and present information on different types of milk through research.

#### **PO4: Research-Related Skills:**

CO1: This can be Demonstrate especially through presentations a comprehensive understanding of the economic significance of dried milk products..

CO4: They will understand the working of spray and roller drier.

CO5: This can be through articulate information on by-products in the dairy industry with clarity.

**PO5: Personal and Professional Competence:**

CO1: Develop personal competence by understanding the economic and industrial aspects of dried milk products.

CO7: Enhance professional competence by gaining knowledge about the diverse applications of milk in various forms.

**PO6: Effective Citizenship and Ethics:**

CO1: Assess the ethical considerations in the dairy industry, particularly concerning the production of dried milk.

**PO7: Environment and Sustainability:**

CO4: Communicate effectively about the functioning of spray and roller driers in the dairy industry.

CO7: Explore and present information on different types of milk through research..

**PO8: Self-directed and Life-long Learning:**

CO5: Cultivate self-directed learning habits by continuously updating knowledge about the dairy industry and its products.

**PO9: Trans-disciplinary Research Competence:**

CO2: Apply knowledge to analyze the production process of dried milk.

## Mapping of Program Outcomes with Course Outcomes

**Class:** T. Y. B. Voc.(SEM – VI)

**Subject:** Dairy Technology

**Course:** Packaging Technology(Th)

**Course Code:** BDT- 602

**Unit-1:** Introduction, Protection of Food products - major role of food packaging - Functions of packaging, Need for protective packaging. Packaging requirements and selection of packaging materials; Types of Container, packaging materials and Forms: Paper and Glass

**Unit-2:** Metals: Tinplate containers, tinning process, components of tinplate, tin free steel (TFS), types of cans, aluminum containers, lacquers; Plastics: types of plastic films, laminated plastic materials, co-extrusion, edible films, biodegradable plastics.

**Unit-3:** Test for Packaging Materials, their methods of testing and evaluation; Barrier properties of packaging materials: Theory of permeability, factors affecting permeability, permeability coefficient, gas transmission rate (GTR) and water vapor transmission (WVTR) rate and its measurement

**Unit-4:** Food packaging systems: Different forms of packaging such as rigid, semi rigid, flexible forms and different packaging system for (a) dehydrated foods (b) frozen foods (c) dairy products (d) fresh fruits and vegetables (e) meat, poultry and sea foods.

**Unit-5:** Vacuum, CA and MA packaging systems, gas packaging machine; seal and shrink packaging machine; form and fill sealing machine; aseptic packaging systems; bottling machines; carton making machines.

### References

1. Crosby NT.1981. *Food Packaging: Aspects of Analysis and Migration Contaminants*. App. Sci. Publ.
2. Kadoya T. (Ed). 1990. *Food Packaging*. Academic Press.
3. Mahadeviah M & Gowamma RV. 1996. *Food Packaging Materials*. Tata McGraw Hill.
4. Palling SJ. (Ed). 1980. *Developments in Food Packaging*. App. Sci. Publ.
5. Painy FA. 1992. *A Handbook of Food Packaging*. Blackie Academic.
6. Sacharow S & Griffin RC. 1980. *Principles of Food Packaging*. AVI Publ.
7. Stanley S & Roger CG.1970. *Food Packaging*. AVI Publ.
8. Gordon L. Robertson: *Food Packaging- Principles and Practice* Marcel Dekker Inc,USA (1993)
9. Donald Downing: *Complete Course in Canning* (3 Volumes) CTI Publications inc, USA (1996)
10. Mathlouthi M. (Editor): *Food Packaging and Preservation* Elsevier Applied Science Publications Essex, UK (1986)
11. J. R.D.David, R. H Graves and V.R. Carlson: *Aseptic Processing and Packaging of Foods*: CRC Press, New York

**Weightage:** 1=weakerlowrelation,2=moderateorpartialrelation,3=strongordirectrelation

	<b>Programme Outcomes(POs)</b>								
<b>Course Outcomes</b>	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3		3				3	3	
CO2	3	3	3	3			2	3	
CO3									
CO4	3	3		3			3	3	
CO5		3	2		2				
CO6	3			3	2		3	3	
CO7	3	3					3		

### **Justification for the mapping**

#### **PO1: Disciplinary Knowledge:**

CO1: Gain expertise in the various packaging materials utilized in the dairy industry.

CO2: They will know the identification and testing of packaging material.

CO4: Conduct research to comprehend the diverse packaging systems employed in the food industry.

CO6: Recognize ethical considerations in the use of different packaging materials in the food and dairy industry, promoting responsible citizenship.

CO7: Explore sustainable practices in packaging systems, aligning with environmental concerns.

#### **PO2: Critical Thinking and Problem Solving:**

CO2: Demonstrate analytical skills in the identification and testing of packaging materials.

CO4: They will understand the different packaging systems used in the food industry.

CO5: Understand the role and functions of packaging in the context of the food and dairy industry, fostering personal and professional competence.

CO7: Explore sustainable practices in packaging systems, aligning with environmental concerns.

#### **PO3: Social Competence Exhibit thoughts and ideas effectively in writing and orally:**

CO1: Gain expertise in the various packaging materials utilized in the dairy industry.

CO2: They will know the identification and testing of packaging material.

CO5: Understand the role and functions of packaging in the context of the food and dairy industry, fostering personal and professional competence.

#### **PO4: Research-Related Skills:**

CO2: Demonstrate analytical skills in the identification and testing of packaging materials.

CO4: Conduct research to comprehend the diverse packaging systems employed in the food industry.

CO6: Recognize ethical considerations in the use of different packaging materials in the food and dairy industry, promoting responsible citizenship.

CO4: Gain trans-disciplinary insights into the packaging systems used for different food products.

**PO5: Personal and Professional Competence:**

CO5: Understand the role and functions of packaging in the context of the food and dairy industry, fostering personal and professional competence.

CO6: Recognize ethical considerations in the use of different packaging materials in the food and dairy industry, promoting responsible citizenship.

**PO7: Environment and Sustainability:**

CO1: Gain expertise in the various packaging materials utilized in the dairy industry.

CO2: Demonstrate analytical skills in the identification and testing of packaging materials.

CO4: Conduct research to comprehend the diverse packaging systems employed in the food industry.

CO6: Recognize ethical considerations in the use of different packaging materials in the food and dairy industry, promoting responsible citizenship.

CO7: Explore sustainable practices in packaging systems, aligning with environmental concerns.

**PO8: Self-directed and Life-long Learning:**

CO1: Gain expertise in the various packaging materials utilized in the dairy industry. CO2: They will know the identification and testing of packaging material.

CO2: Demonstrate analytical skills in the identification and testing of packaging materials.

CO4: Conduct research to comprehend the diverse packaging systems employed in the food industry.

CO6: Recognize ethical considerations in the use of different packaging materials in the food and dairy industry, promoting responsible citizenship.



CO7		3			3				
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### **Justification for the mapping**

#### **PO1: Disciplinary Knowledge:**

CO6: Gain a comprehensive understanding of the concept of entrepreneurship as a part of their disciplinary knowledge.

#### **PO2: Critical Thinking and Problem Solving:**

CO4: Enhance problem-solving abilities by recognizing the qualities and traits essential for entrepreneurship.

CO7: Learn skills for becoming a successful entrepreneur, contributing to personal and professional competence.

#### **PO3: Social Competence - Exhibit thoughts and ideas effectively in writing and orally:**

CO3: Acquire skills in structuring project reports, demonstrating proficiency in research-related competencies.

#### **PO4: Research-Related Skills:**

CO3: Acquire skills in structuring project reports, demonstrating proficiency in research-related competencies.

CO1: Enhance trans-disciplinary research competence by gaining insights into various domains related to entrepreneurship.

#### **PO5: Personal and Professional Competence:**

CO4: Enhance problem-solving abilities by recognizing the qualities and traits essential for entrepreneurship.

CO7: Learn skills for becoming a successful entrepreneur, contributing to personal and professional competence.

#### **PO6: Effective Citizenship and Ethics:**

CO5: Be educated on laws and regulations pertinent to industries, fostering a sense of ethical entrepreneurship and effective citizenship.

#### **PO8: Self-directed and Life-long Learning:**

CO2: Develop critical thinking skills by becoming aware of all the institutes providing entrepreneurial support.

CO6: Develop self-directed and life-long learning skills through exposure to various aspects of entrepreneurship and its continuous evolution.

#### **PO9: Trans-disciplinary Research Competence:**

CO1: Enhance trans-disciplinary research competence by gaining insights into various domains related to entrep



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## Mapping of Program Outcomes with Course Outcomes

**Class:** T. Y. B. Voc.(SEM – VI)

**Subject:** Dairy Technology

**Course:** dairy product development (Pr)

**Course Code:** BDT- 6.1

### Objectives-

- **To prepare and study different types of milks and it's processing.**

1. Preparation of flavoured milk
2. Preparation of condensed milk
3. Preparation of Ice cream
4. Preparation of SMP/WMP by spray drying
5. Preparation of rehydrated milk
6. Preparation of recombinant Milk
7. Preparation of whey powder
8. Preparation of whey beverages

**Weightage:** 1=weakorlowrelation,2=moderateorpartialrelation,3=strongordirectrelation

Course Outcomes	Programme Outcomes(POs)								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3		2	3	3	2			
CO2	3	3	2						3
CO3	3		3						
CO4		3		3			1		
CO5	3	3	3	3				3	
CO6	3	3	3						
CO7	3		3		2		1		

### Justification for the mapping

#### PO1: Disciplinary Knowledge:

CO1: Demonstrate a comprehensive understanding of the economic significance of dried milk products..

CO2: Apply critical thinking skills to analyze the production process of dried milk.

CO3: Differentiate between ice-cream and frozen dairy dessert, showcasing critical reasoning abilities.

CO5: Articulate information on by-products in the dairy industry with clarity..

CO6: Investigate and present principles and workings behind spray drying in the production of dried milk.

CO7: Explore and present information on different types of milk through research.

**PO2: Critical Thinking and Problem Solving:**

CO2: Apply critical thinking skills to analyze the production process of dried milk.

CO4: They will understand the working of spray and roller drier.

CO5: Articulate information on by-products in the dairy industry with clarity

CO6: Investigate and present principles and workings behind spray drying in the production of dried milk.

**PO3: Social Competence Exhibit thoughts and ideas effectively in writing and orally:**

CO1: This can be Demonstrate especially through presentations a comprehensive understanding of the economic significance of dried milk products..

CO2: Apply critical thinking skills especially through presentations to analyze the production process of dried milk.

CO3: Through reports, Differentiate between ice-cream and frozen dairy dessert, showcasing critical reasoning abilities.

CO5: This can be through Articulate information on by-products in the dairy industry with clarity..

CO6: Investigate and present principles and workings behind spray drying in the production of dried milk.

CO7: Explore and present information on different types of milk through research.

**PO4: Research-Related Skills:**

CO1: This can be Demonstrate especially through presentations a comprehensive understanding of the economic significance of dried milk products..

CO4: They will understand the working of spray and roller drier.

CO5: This can be through articulate information on by-products in the dairy industry with clarity.

**PO5: Personal and Professional Competence:**

CO1: Develop personal competence by understanding the economic and industrial aspects of dried milk products.

CO7: Enhance professional competence by gaining knowledge about the diverse applications of milk in various forms.

**PO6: Effective Citizenship and Ethics:**

CO1: Assess the ethical considerations in the dairy industry, particularly concerning the production of dried milk.

**PO7: Environment and Sustainability:**

CO4: Communicate effectively about the functioning of spray and roller driers in the dairy industry.

CO7: Explore and present information on different types of milk through research..

**PO8: Self-directed and Life-long Learning:**

CO5: Cultivate self-directed learning habits by continuously updating knowledge about the dairy industry and its products.

**PO9: Trans-disciplinary Research Competence:**

CO2: Apply knowledge to analyze the production process of dried milk.

## Mapping of Program Outcomes with Course Outcomes

**Class:** T. Y. B. Voc.(SEM – VI)

**Subject:** Dairy Technology

**Course:** Packaging Technology (Pr)

**Course Code:** BDT- 6.2

- 1) Identification and testing of packaging materials
- 2) Determination of wax from wax paper;
- 3) Testing of lacquered tin plate sheets;
- 4) Measurement of tin
- 5) Determination of equilibrium moisture content;
- 6) Grading of glass bottles for alkalinity;
- 7) Determination of water vapour transmission rate of packaging material;
- 8) To perform vacuum packaging of food sample and carry out its storage study;
- 9) Testing the compression strength of the boxes;
- 10) Packaging the food material in seal and shrink packaging machine and study its shelf life;
- 11) Testing the strength of glass containers by thermal shock test; Testing the strength of filled pouches by drop tester.
- 12) Preparation of album of different types of packaging.
- 13) Visit to industry
- 14) Preparation of visit report & presentation

### References

12. Crosby NT.1981. *Food Packaging: Aspects of Analysis and Migration Contaminants*. App. Sci. Publ.
13. Kadoya T. (Ed). 1990. *Food Packaging*. Academic Press.
14. Mahadeviah M & Gowramma RV. 1996. *Food Packaging Materials*. Tata McGraw Hill.
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20. Donald Downing: *Complete Course in Canning (3 Volumes)* CTI Publications inc, USA (1996)
21. Mathlouthi M. (Editor): *Food Packaging and Preservation* Elsevier Applied Science Publications Essex, UK (1986)
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**Weightage:** 1=weaker or low relation, 2=moderate or partial relation, 3=strong or direct relation

Course Outcomes	Programme Outcomes(POs)								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3		3				3	3	
CO2	3	3	3	3			2	3	
CO3									
CO4	3	3		3			3	3	
CO5		3	2		2				
CO6	3			3	2		3	3	
CO7	3	3					3		

### Justification for the mapping

#### PO1: Disciplinary Knowledge:

CO1: Gain expertise in the various packaging materials utilized in the dairy industry.

CO2: They will know the identification and testing of packaging material.

CO4: Conduct research to comprehend the diverse packaging systems employed in the food industry.

CO6: Recognize ethical considerations in the use of different packaging materials in the food and dairy industry, promoting responsible citizenship.

CO7: Explore sustainable practices in packaging systems, aligning with environmental concerns.

#### PO2: Critical Thinking and Problem Solving:

CO2: Demonstrate analytical skills in the identification and testing of packaging materials.

CO4: They will understand the different packaging systems used in the food industry.

CO5: Understand the role and functions of packaging in the context of the food and dairy industry, fostering personal and professional competence.

CO7: Explore sustainable practices in packaging systems, aligning with environmental concerns.

#### PO3: Social Competence Exhibit thoughts and ideas effectively in writing and orally:

CO1: Gain expertise in the various packaging materials utilized in the dairy industry.

CO2: They will know the identification and testing of packaging material.

CO5: Understand the role and functions of packaging in the context of the food and dairy industry, fostering personal and professional competence.

#### PO4: Research-Related Skills:

CO2: Demonstrate analytical skills in the identification and testing of packaging materials.

CO4: Conduct research to comprehend the diverse packaging systems employed in the food industry.

CO6: Recognize ethical considerations in the use of different packaging materials in the food and dairy industry, promoting responsible citizenship.

CO4: Gain trans-disciplinary insights into the packaging systems used for different food products.

**PO5: Personal and Professional Competence:**

CO5: Understand the role and functions of packaging in the context of the food and dairy industry, fostering personal and professional competence.

CO6: Recognize ethical considerations in the use of different packaging materials in the food and dairy industry, promoting responsible citizenship.

**PO7: Environment and Sustainability:**

CO1: Gain expertise in the various packaging materials utilized in the dairy industry.

CO2: Demonstrate analytical skills in the identification and testing of packaging materials.

CO4: Conduct research to comprehend the diverse packaging systems employed in the food industry.

CO6: Recognize ethical considerations in the use of different packaging materials in the food and dairy industry, promoting responsible citizenship.

CO7: Explore sustainable practices in packaging systems, aligning with environmental concerns.

**PO8: Self-directed and Life-long Learning:**

CO1: Gain expertise in the various packaging materials utilized in the dairy industry. CO2: They will know the identification and testing of packaging material.

CO2: Demonstrate analytical skills in the identification and testing of packaging materials.

CO4: Conduct research to comprehend the diverse packaging systems employed in the food industry.

CO6: Recognize ethical considerations in the use of different packaging materials in the food and dairy industry, promoting responsible citizenship.

Choice Based Credit System Syllabus  
(2019 pattern)

**Mapping of Program Outcomes with Course Outcomes**

**Class:** T. Y. B. Voc. (SEM – VI)

**Subject:** Dairy Technology

**Course:** In-plant training (Pr)

**Course Code:** BDT- 6.3

**Objective-**

Students should undergo a project work for a period of 90 days, during the Six Semester. The programme is arranged by the Department of Food Technology and Research in consultation with the Dairy/Food industries. The purpose of the programme is to get hands-on experience on various aspects of Dairy/Food industries that form the strong foundation for the young Dairy/Food technologists. The department will allot students to the industry, in consultation with the industry concerned. Student should report for the programme on the stipulated date. On completion, each student should prepare a project report duly certified by the supervisor in the industry. Consequently, a seminar should be conducted in the department to present the finding of the project work. The bonafide project report attested by the head of the department will be evaluated by the external and internal examiner and a viva voce will be conducted.

**Weightage:** 1=weak or low relation, 2=moderate or partial relation, 3=strong or direct relation

Course Outcomes	Programme Outcomes(POs)								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3							3	3
CO2	3								3
CO3	3								3
CO4		3		3					3
CO5		3			3	3			
CO6			3					3	
CO7			3	3		3			3

**Justification for the mapping**

**PO1: Disciplinary Knowledge:**

CO1. Gain proficiency in various aspects of dairy management.

CO2. Acquire a comprehensive understanding of the practical operations within the dairy industry.

CO3. Illustrate critical factors influencing the development of the dairy sector.

**PO2: Critical Thinking and Problem Solving:**

CO4. Demonstrate effective problem-solving and management skills in the context of dairy operations.

CO5. Communicate thoughts and ideas related to dairy management both in writing and orally.

**PO3: Social Competence Exhibit thoughts and ideas effectively in writing and orally:**

CO6. Learn and apply professional protocols essential for industrial work in the dairy sector.

CO7. Develop research skills relevant to the dairy and food industries.

**PO4: Research-Related Skills:**



CO4. Demonstrate effective problem-solving and management skills in the context of dairy operations.  
CO7. Develop research skills relevant to the dairy and food industries.

**PO5: Personal and Professional Competence:**

CO5. Communicate thoughts and ideas related to dairy management both in writing and orally.

**PO6: Effective Citizenship and Ethics:**

CO5. Communicate thoughts and ideas related to dairy management both in writing and orally.  
CO7. Develop research skills relevant to the dairy and food industries.

**PO8: Self-directed and Life-long Learning:**

CO1. Gain proficiency in various aspects of dairy management.  
CO6. Learn and apply professional protocols essential for industrial work in the dairy sector.

**PO9: Trans-disciplinary Research Competence:**

CO1. Gain proficiency in various aspects of dairy management.  
CO2. Acquire a comprehensive understanding of the practical operations within the dairy industry.  
CO3. Illustrate critical factors influencing the development of the dairy sector.  
CO4. Demonstrate effective problem-solving and management skills in the context of dairy operations.  
CO7. Develop research skills relevant to the dairy and food industries.